

WASHINGTON

SCIENCE TRENDS

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DIRECTORY

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* THE KENNEDY ADMINISTRATION

As a candidate, Sen. John F. Kennedy based a large share of his campaign on the technological "race" with the Soviet Union, both in the field of defense and those areas of engineering known to the voter as "science." In a sense, the Russian (or German?) who pushed the button on Sputnik I and erased the confident image of American leadership also launched the U. S. Presidential campaign.

Mr. Kennedy has now won that campaign by the narrowest of margins. The time for criticism by the candidate has now past; the time for action as the President lies ahead. Here are some of the areas where observers in Washington expect action to be taken:

✓ Reorganization of the Defense Department to take advantage of the new technology which, to many, makes the traditional roles and missions of the various services unwieldly and obsolete. Sen. Stuart Symington, (D.) Mo. a former Secretary of the Air Force and an apostle of air power/missile power, is drawing up his own reorganization plan at Mr. Kennedy's request. Navy and Army officials are already uneasy.

✓ Reorganization of Federal Science Agencies, perhaps into one Department of Science. This step has been bitterly opposed by Government officials who now run such agencies, as well as many of their colleagues (particularly on the academic level) who find the present arrangement comfortable since it offers so many different offices willing to listen to proposals for grants and financial aid. On the other hand, many of Mr. Kennedy's Senate colleagues feel reorganization is long overdue.

✓ Further Expansion of the Space Agency, without any major reorganizations. Vice President-elect Lyndon Johnson, who says he specializes in such matters, has had no serious complaints over the organization of the National Aeronautics and Space Administration, which he helped to create. He has, however, called for greater spending on space research and for closer liaison with the Pentagon.

✓ Other actions which are being forecast include:

Increased spending on Polaris and Minuteman missile systems, and a temporary step-up in Atlas production.

More funds for basic research, particularly at the college and university level.

More Pentagon money for Army airlift, and modernization of equipment for the Army and Marine Corps. This means heavy electronics and tactical missile buying in the months ahead. More money for antisubmarine warfare research and equipment. More money for an Airborne heavy bomber alert, including funds for spare engines and parts. More emphasis on defense subcontracts for small business and depressed areas. And a brighter future for the Nike-Zeus anti-missile-missile program.

* HIGH TEMPERATURE MATERIALS

Studies for the U. S. Navy, now publicly available, indicate possible new avenues of approach in the search for a "universal" elastomeric material which can survive in a high-temperature (1000°F) environment.

Among the possibilities:

- ✓ Substitution of inorganic materials such as ceramics, glasses and metals for specific items such as hoses, gaskets and potting compounds. However, this introduces complicated design problems since such materials do not possess inherent high elasticity and must first be fabricated into such forms as a spring, fiber or thin sheet.
- ✓ Altering material structures is another possible approach toward high elasticity without sacrifice of thermal stability. This is based on the finding that "rubberiness" is not related to any special composition, but is rather a state of matter which depends, to a large extent, on the nature of bonds between structural units.

Possibilities in this field, as outlined for the Navy include:

- ø Plasticizing of Glass -- based on the concept that the internal structure of cooled glass is polymeric and that a suitable agent such as a high-boiling liquid, could be used to plasticize glass in a manner similar to that used with many organic polymers.
- ø Irradiation of Organic Polymers -- based on the belief that varying dosages of ionizing radiation could produce a product which is flexible and elastomeric rather than hard and brittle.
- ✓ Improving ductile silver compounds is a third possible basic approach based on the ductility and malleability of various compounds.
- ✓ Study of ductility in nonmetallic materials is another possible means of attaining a "universal" elastomer and is based on special properties of crystal structure. One promising subject of study is nonmetallic silver chloride and similar compounds. It is believed possible that plasticity and flexibility might be increased by filler materials such as magnesium oxide, silicon dioxide and carbon. Such items as O-rings, gaskets and potting or sealing compounds might be practical.

(R&D by Trionics Corporation, Madison, Wisconsin reported to the Navy under Contract NOas 58-437-c. Final report now available through military channels or at \$1.25 from OTS, U. S. Department of Commerce, Washington 25, D. C. Ask for PB 161 813.)

* "SUPERALLOY" DATA PUBLISHED

A collection of previously unpublished industrial data on the new "superalloy" WI-52 is now available publicly. The material was compiled by the Defense Metals Information Center, Battelle Memorial Institute, "in response to many requests from aircraft design engineers."

The cobalt-chromium-tungsten alloy was developed for gas-turbine components requiring high-strength properties in the 1000° to 2000°F temperature range. Principle use has been for a first-stage turbine vane replacing X-40 (HS 31) alloy. However, above 1800°F it may be useful in applications requiring resistance to thermal shock, fatigue and oxidation -- but with lower strength requirements. WI-52 is available only in the form of castings.

(Details available. Write OTS, U. S. Department of Commerce, Washington 25, D. C. for PB 161 216. 21 Pages. 50 Cents.)

TECHNICAL TRENDS

- The National Bureau of Standards has developed a differential bomb calorimetric procedure for measuring the potential heat of materials in building fires. Details are available from the Bureau's Office of Technical Information, Washington 25, D. C. ✓✓✓ Army Ordnance has decided to continue support of research at Texaco Experiment, Inc., Richmond, Va. looking toward development of an annular air-breathing sustainer propulsion device in the space surrounding the nozzle of a conventional rocket motor. ✓✓✓ The National Science Foundation, Office of Information, Washington 25, D. C. has available details of \$9.8 million in grants to 43 colleges and universities to support academic year institutes for science and mathematics teachers.
- Diamond Ordnance Fuze Laboratory, U. S. Army, will hold another in its exceedingly popular demonstrations of pure fluid amplification (SCIENCE TRENDS, March 8, 1960). Interested participants should write to Mr. John Wheeler, 106 Manse Bldg., Diamond Ordnance, Washington 25, D. C. ✓✓✓ President Eisenhower has signed an executive order permitting extra pay for crew members and operators of experimental oceanographic research vehicles such as the Trieste, as well as on and off-duty crews of the Polaris submarines. ✓✓✓ A new reliability office has been established at the George C. Marshall Space Flight Center, NASA, Huntsville, Alabama, in line with the space agency's policy of putting responsibility for reliability on the respective design organizations. The office will be headed by Heinrich A. Schulze.
- Atomic Energy Commission will co-sponsor a one-day conference on the Use of Radioisotopes in the Coal Industry in Pittsburgh, Pa. November 17. For details contact George W. Sall. American Mining Congress, Suite 1102, Ring Building, 1810 M Street, N. W., Washington 6, D. C. ✓✓✓ Navy is interested in commercial anti-icing finishes for its aircraft which may be superior to the lacquer now used. Details are available from Director, Aeronautical Materials Laboratory, Naval Air Material Center, Philadelphia 12, Pa. ATTN: XM-44-JO. ✓✓✓ General Atomics Division of General Dynamics Corporation has been awarded a \$190,000 contract for development of a high-temperature thermionic converter. A rated output of 75 watts is anticipated in the Air Force sponsored program, being carried out at the company's San Diego laboratories.
- A new survey of developments in West Germany's booming photographic industry is available at 25 cents from the Superintendent of Documents, Government Printing Office, Washington 25, D. C. Ask for Publication 8Z. ✓✓✓ A second discovery of widespread beryllium mineralization has been made in central Idaho, in the Yellow Jacket mountain area. The beryl was found through reconnaissance sampling by the U. S. Bureau of Mines and the state Bureau of Mines and Geology. ✓✓✓ The Federal Aviation Agency has ordered a special antenna system and a high powered amplifier for tests to determine whether a forward scatter system can be made effective in the very high frequencies now used for airways communications. Two terminals will be established at first on the Western side of the Atlantic. If successful, later transmitters will also be located on the European side. ✓✓✓ An electron beam process for welding and cutting developed by the Carl Zeiss Foundation of West Germany will be studied under an Army Signal Corps contract with Hamilton Standard Division of United Aircraft, which holds North American rights. The technique is expected to be useful in electrical connections for micro-assemblies.

RESEARCH CHECKLIST

- NEW THERMAL RADIATION DETECTOR: Studies at the Goddard Space Flight Center, National Aeronautics and Space Administration, Greenbelt, Md. indicate the feasibility of a new type of thermal radiation detector -- the dielectric bolometer. The sensitivity of infrared detectors, it is believed, is limited chiefly by so-called Johnson noise, which is caused by velocity fluctuations of electrons in the conduction band. In the proposed bolometer this type of noise is said to be practically nonexistent, so that the dielectric bolometer "approaches the ultimate sensitivity of thermal detectors to an unprecedented degree." Researchers now have a measurement program underway to show the feasibility of this approach by experimental means. (For details, write National Aeronautics and Space Administration, Attn: BID, Washington 25, D. C. for NASA Technical Note D-500.)
- ENGINE COOLANTS: Studies at the Army's Aberdeen (Md.) Proving Ground suggest that no substantial improvement is feasible in automobile engine coolants until cooling systems themselves are re-designed. Fins on engine blocks and crank cases should be considered, the Army states, as well as radical departures in the design and location of radiators. The greatest benefit would be realized through increased thermal efficiency of the engine itself -- and this would also contribute to fuel economy. (Details of tests and recommendations available through military channels or at 75 cents from OTS, U. S. Department of Commerce, Washington 25, D. C. Ask for Report CCL No. 90, Aberdeen Proving Ground.)
- COPPER-BALL ACCELEROMETER: Naval research has resulted in new types of copper-ball accelerometers used to record peak shocks where more sophisticated instrumentation is too bulky or fragile. Principal modification is in discriminator mechanisms, which measure one particular shock when several pulses occur in close time sequence. A typical application is in water entry testing in which a missile can experience a high deceleration at impact, a low deceleration or drag through the water, and a third impact when it hits bottom. The discriminator mechanisms automatically interrupt measurement recordings, so that either the initial or final shock is registered. Such peak reading devices are expected to prove of value until a breakthrough occurs in continuous shock-recording instrumentation to reduce the cost or size of this equipment and increase its resistance to shock. (R&D by Environment Simulation Division, U. S. Naval Ordnance Laboratory, White Oak, Silver Spring, Md.)
- FERRIELECTRIC MATERIALS: A new group of materials with ferroelectric properties is said to have been discovered in the course of Air Force sponsored research at the Catholic University of America, Washington, D.C. The materials are described as ferrielectrics because of a structural analogy with ferrimagnetic materials. The first of the new materials is a composition of sodium niobate and sodium vanadate. The discovery is believed to represent a significant advance in the search for computer elements usable at high temperatures. (Studies directed by C. F. Pulvari reported in Wright Air Development Division Technical Report 60-146. 112 Pages. Available through military channels or at \$2.50 from OTS, U. S. Department of Commerce, Washington 25, D. C.)

- SIMULATED AERODYNAMIC HEATING: Quartz-tube lamps are being used by researchers at the Langley (Va.) Research Center of the National Aeronautics and Space Administration to simulate aerodynamic heating in a wind tunnel. The system is of interest because there are few facilities in the U. S., except for some blowdown tunnels, which can accomodate large structures and also provide the heating required for aerothermoelastic tests. The device can withstand direct exposure of the lamps to the airstream and has been used successfully to heat full-size structural wind panels in a supersonic tunnel.

(Details available from NASA, ATTN: CODE BID, Washington 25, D. C. Ask for NASA Technical Note D-530.)

- NEW DIAMETER GAGE: Research at the Atomic Energy Commission's Savannah River Laboratory has resulted in development of a new and highly accurate micrometer for corrosion samples. The device is used to determine the amount of metal lost from a cylindrical aluminum rod subjected to a corrosive environment. Nonconductive surface films had made such measurements difficult. The device uses Eddy current techniques and is said to be accurate to ± 0.00005 inch.

(Details available through AEC channels or write OTS, U. S. Department of Commerce, Washington 25, D. C. for Report DP - 488. 10 Pages. 50 Cents.)

- ELECTRONIC SAMPLING PROCEDURES: The National Bureau of Standards has studied four acceptance sampling plans that are representative of life-testing procedures currently used in the electronics industry. It was found that these widely used techniques are "very sensitive" to departures from the initial mathematical assumptions. The Bureau believes its studies "demonstrate dramatically the risks taken by an experimenter who adopts an acceptance sampling procedure without possessing sufficient knowledge of the underlying properties of the observed phenomena."

(For Details of Statistical Life Testing Procedures Research write National Bureau of Standards, Office of Technical Information, Washington 25, D. C.)

- REDUCING TRANSMISSION NOISES: U. S. Naval Ordnance Test Station, China Lake, Calif. has conducted research on the reduction of transmission noises, a problem of major importance when such equipment is used in conjunction with sensitive acoustic devices. This has resulted in a law of acoustic energy, which may possibly be valid for all gear trains. It is believed that at only moderate speeds the velocity of air pumped out between the teeth approaches the speed of sound. The shock waves then formed in the air, it is stated, should add appreciably to the acoustic radiated energy. Experiments seem to bear out this line of reasoning.

(Details available through military channels, or write OTS, U. S. Department of Commerce, Washington 25, D. C. for NAVORD Report 6569, 51 Pages. \$1.50.)

- PLASTIC ABLATION STUDIES: The Air Force is sponsoring studies aimed at improved methods for predicting the behavior of ablation materials under re-entry and rocket nozzle conditions. First step in the project is the classification of information concerning the ablation of plastics under extreme environmental conditions. This is expected to lead to a mathematical guide to predict definite behavior patterns of certain materials under specific conditions.

(R&D for Plastics Branch, Nonmetallic Materials Laboratory, Wright Air Development Division, Wright-Patterson Air Force Base, Ohio by Structural Materials Division, E. L. Rucks, Director, Aerojet-General Corporation, Azusa, Calif.)

P U B L I C A T I O N C H E C K L I S T

- ☐ RADIOISOTOPE MANUAL, described by the Atomic Energy Commission as "the first full-fledged laboratory manual on radioisotopes for use in college and university chemistry courses." (A sample copy, together with a set of instructor notes, is available free to colleges and universities upon request to the Director, Office of Isotopes Development, U. S. AEC, Washington 25, D. C. Multiple copies are available at \$2 for the manual and \$1 for instructor notes from OTS, U. S. Department of Commerce, Washington 25, D. C.)
- ☐ ALASKAN PETROLEUM, a report which indicates that a large Alaskan oil field previously thought to be of little value because of permanently frozen oil sands and unusually low formation pressures can actually permit "substantial" petroleum recovery. Single Copies Free. (Write Publications-Distribution Section, U. S. Bureau of Mines, 4800 Forbes Avenue, Pittsburgh 13, Pa.)
- ☐ RUSSIAN MILITARY DICTIONARY, a U. S. Army Russian-English translation of a dictionary of 1,500 Russian operational, tactical and general military terms. Originally published by the USSR Ministry of Defense for Soviet officers. 360 Pages. \$5. (Write OTS, U. S. Department of Commerce, Washington 25, D. C. for Publication 60-21783.)
- ☐ AEC LABORATORIES, a report by the Atomic Energy Commission detailing future plans for its various national laboratories. Also includes a number of comments from industry and private organizations on such plans, and other valuable background material. 277 Pages. Single Copies Free. (Write Joint Committee on Atomic Energy, F-88, The Capitol, Washington 25, D. C. for "The Future Role of the AEC Commission Laboratories.")
- ☐ NAVIGATION SATELLITES, an excellent technical presentation on the use of artificial satellites for navigation and oceanographic surveys. Also includes a simple mathematical treatment of the relation between satellite velocities, periods and heights. 24 Pages. 25 Cents. (Write Superintendent of Documents, Government Printing Office, Washington 25, D. C. for Coast and Geodetic Survey Technical Bulletin No. 12.)
- ☐ GOVERNMENT RESEARCH BIBLIOGRAPHIES: the following selective bibliographies listing Government research reports and other technical documents available to science and industry may now be obtained (at 10 cents each) from OTS, U. S. Department of Commerce, Washington 25, D. C.:
 - SB 417: Photographic Chemicals and Emulsions
 - SB 418: Solar Energy Applications
 - SB 419: Desalination of Water
 - SB 410: Bearings
 - SB 414: Columbium and Tantalum
 - SB 415: Molybdenum and Tungsten
 - SB 420: Platinum and other metals
- ☐ DIRECTORY OF NATIONAL ASSOCIATIONS, a new publication listing over 2,000 national associations, with data on each. Also provides information on societies of engineers and scientists. A "best seller" when last published in 1956. 50 Cents. (Write Superintendent of Documents, Government Printing Office, Washington 25, D. C.)
- ☐ SYNTHETIC ORGANIC CHEMICALS, a new report showing that 1959 production was 12.3 percent above 1958 totals. Report covers more than 6,000 individual chemicals and chemical products, with separate production and sales statistics for many of them. \$1. (Write Superintendent of Documents, Government Printing Office, Washington 25, D. C. for Synthetic Organic Chemicals Report No. 206, Second Series.)

Research and Development Directory

Ø ORDNANCE CORPS (continued)

✓ U. S. ARMY ORDNANCE SPECIAL WEAPONS-AMMUNITION COMMAND

Dover, New Jersey

Interests - Centralized command over all Army Ordnance Special Weapons and conventional Ammunition operations - development, procurement, supply control, maintenance - of subordinate commands; the Ordnance Ammunition Command and Picatinny Arsenal. The businessman seeking R&D business in Special Weapons (Atomic Warheads, Atomic adaption kits and demolitions) should contact either this command or Picatinny Arsenal for the items listed for Picatinny.

✓ WHITE SANDS MISSILE RANGE

Las Cruces, New Mexico

Interests - Engineering Tests; Equipment and/or professional operations in support of: Long Range Research on Rockets and Guided Missiles.

✓ WATERVLIET ARSENAL

Watervliet, New York

Interests - Cannon for Medium and Heavy Field Artillery, AA, Anti-tank, and Combat Vehicles; mortars, with Carriages and Carts.

✓ OFFICE OF ORDNANCE RESEARCH

Box CM, Duke Station
Durham, North Carolina

Interests - Fundamental Research of ultimate interest to the Ordnance Corps, primarily with universities and nonprofit institutions.

✓ ORDNANCE WEAPONS COMMAND

Rock Island, Illinois

Interests - Broad Areas of Research and Development covering the responsibilities delineated under Rock Island Arsenal, Springfield Armory, and Watertown Arsenal; and Weapons Systems.

✓ ROCK ISLAND ARSENAL

Rock Island, Illinois

Interests - Arm Racks: Carriages for Towed Cannon; Hand Carts; Hydro-pneumatic Recoil Mechanisms; Launchers, rocket, ground-to-ground; Limbers; Linking and Delinking Machines; Recoil Mechanisms; and Target Materiel.

✓ SPRINGFIELD ARMORY

Springfield 1, Massachusetts

Interests - Automatic Aircraft Weapons, all calibers; Belt Links and Clips, up to and including 30 mm; Chargers; Feed Mechanisms; Flash Hiders; Ground Type Weapons, up to and including 30 mm; Machine Guns, up to and including 30 mm; and Mounts for Machine Guns.

✓ WATERTOWN ARSENAL

Watertown 72, Massachusetts

Interests - Carriages for Towed and Heavy Field Guns; Mounts for AA Guns; Recoil Mechanisms for AA Guns; and Rocket Launchers (ground-to-air).

Research and Development Directory

Ø ORDNANCE CORPS (continued)

✓ ORDNANCE MATERIALS RESEARCH OFFICE

Watertown Arsenal
Watertown 72, Massachusetts

Interests - Materials Research

ELEVEN ORDNANCE DISTRICTS

The Ordnance Corps has a Qualitative Development Requirement Information Program. This Program enables the businessman to obtain information regarding new developments far in advance of the time when specific related contracts come under consideration in which the Ordnance Corps is interested, easily and quickly.

Details available at District Offices at the following locations:

Birmingham Ordnance District
2120 North Seventh Avenue
Birmingham, Alabama

Boston Ordnance District
Boston Army Base
Boston 10, Mass.

Chicago Ordnance District
209 West Jackson Blvd.
Chicago 6, Illinois

Cincinnati Ordnance District
Swift Bldg.
230 East Ninth Street
Cincinnati 2, Ohio

Cleveland Ordnance District
Lincoln Bldg.
1369 East Sixth Street
Cleveland 14, Ohio

Detroit Ordnance District
574 East Woodbridge
Detroit 31, Michigan

Los Angeles Ordnance District
55 South Grand Avenue
Pasadena, California

New York Ordnance District
770 Broadway
New York 3, New York

Philadelphia Ordnance District
128 North Broad Street
Philadelphia 2, Pennsylvania

St. Louis Ordnance District
4300 Goodfellow Blvd.
St. Louis 20, Missouri

San Francisco Ordnance District
1515 Clay Street
P. O. Box 1829
Oakland 12, California

Ø QUARTERMASTER CORPS

✓ THE QUARTERMASTER RESEARCH AND ENGINEERING COMMAND

Natick, Massachusetts

Interests - Chemicals and Plastics; Dispensing and Handling Equipment; Environmental Protection; Foods; Individual Clothing and Equipment; Mechanical Equipment; and Test Methods and Techniques.

Ø TRANSPORTATION CORPS

✓ U. S. ARMY TRANSPORTATION RESEARCH COMMAND

Fort Eustis, Virginia

Interests - Aircraft (All R&D for Army Aviation); Marine Transport; Materials; Motor Transport; Rail; Terminal Operations; Transportation Engineering; and Transportation Research of Ultimate Interest to the Transportation Corps, primarily with universities and nonprofit institutions.

